

**MOD 777H
MOD 777D**

**NAVSHIPS 0347-183-0000
NAVSHIPS 0347-0601**

Instruction Book

A. C. PORTABLE SUBMERSIBLE PUMP

MODEL 777H-ALUMINUM

MODEL 777D-BRONZE



PUMPS & SYSTEMS

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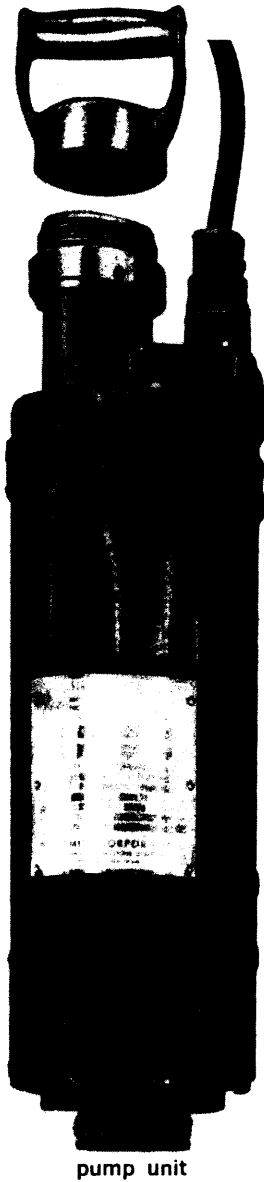
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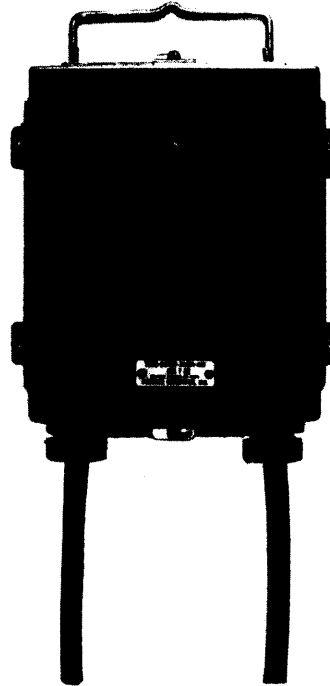
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MODEL 777 - A. C. PORTABLE SUBMERSIBLE PUMP

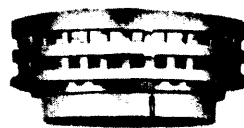
carrying handle



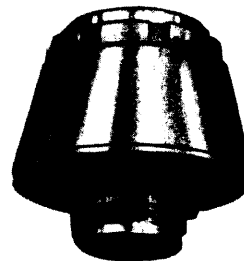
pump unit



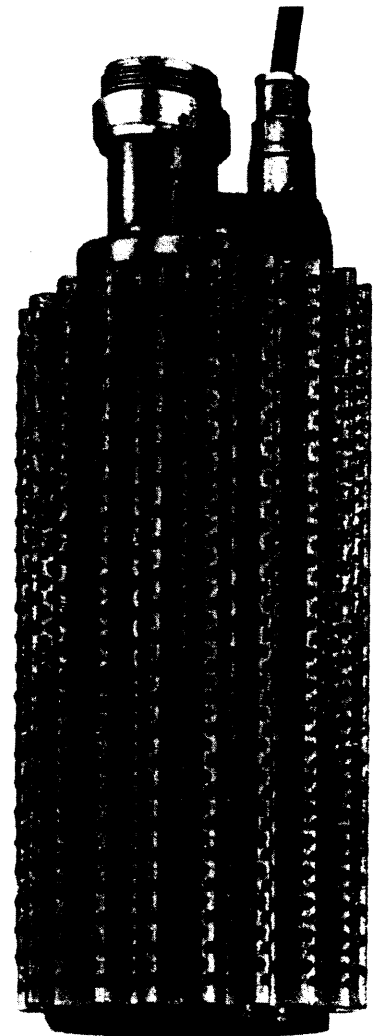
watertight switch



basket strainer



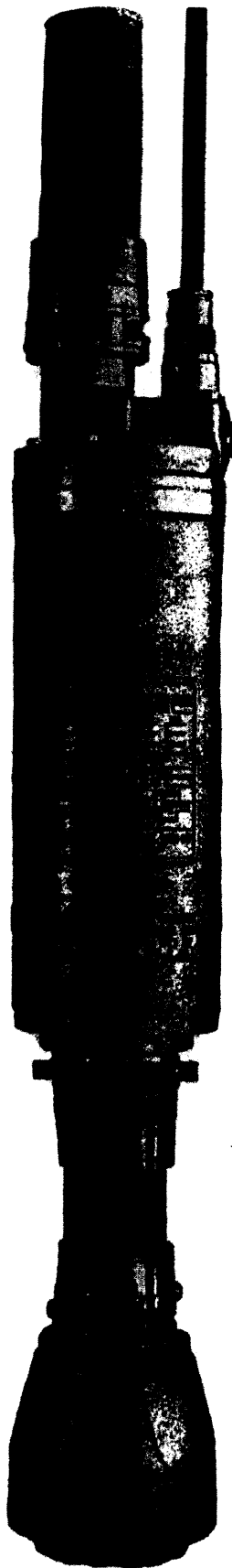
foot valve



pump with
star strainer in place

**COMPLETE MODEL 777 PUMP
FRONTISPIECE**

MODEL 777 – A. C. PORTABLE SUBMERSIBLE PUMP



**VIEW SHOWING
METHOD OF MOUNTING SUCTION HOSE BETWEEN
PUMP AND FOOT VALVE ASSEMBLY**

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SECTION 1

General Data

The portable submersible pump A. C. described, conforms with Military Specification MIL-P-17454. Model 777 is assigned as the designation by Prosser Industries, the manufacturer.

Motor Unit

Motor rating: H.P. 5, Phase 3, Cycle 60, RPM 3450, Voltage (as specified) 115, 220 or 440 A.C.

Voltage	Class	Amperes		
		Full Load	Locked Rotor	Starting Condition
115	3	30	120	60
220	2	15	60	30
440	1	9	30	15

Capacity

Pump rated capacity: 140 G.P.M. at 70 ft. total head.
200 G.P.M. at 50 ft. total head.

Weights

Weight of pump and component parts are as follows:

	MODELS	
	BRONZE 777D	ALUM. 777H
Net weight of pump with basket strainer, less cables, foot valve and switch	103	61 lbs.
Net weight of foot valve	11	11 lbs.
Net weight of handle	3	1 lb.
Net weight of basket strainer	4 $\frac{3}{4}$	4 $\frac{3}{4}$ lbs.
Net weight of star strainer	18 $\frac{3}{4}$	6 $\frac{1}{4}$ lbs.
Net weight of cable	20	20 lbs.
Net weight of switch	10 $\frac{1}{2}$	10 $\frac{1}{2}$ lbs.
Net weight of repair parts and box	95	80 lbs.
Net weight of complete pump including cable, switch, basket strainer	135	105 lbs.
Net weight of complete pump including cable, switch, star strainer	156	101 lbs.
Shipping weight of pump	200	158 lbs.
Shipping weight of repair parts and box	125	108 lbs.

SECTION 2

Pumps – Detailed Description

Pump

The pump unit is simple in design, consisting of a squirrel cage induction motor mounted within a water-jacketed case and having a pump runner mounted on the motor shaft within the pump casing at the suction end of the pump. The suction and discharge are at opposite ends of the pump, all water passing through the water jacket thus cooling the motor.

The pump is designed to operate either submerged or not submerged and in any position; horizontal, vertical or any midway position. The pump will handle either fresh or salt water.

Motor

The pump motor has a continuous duty rating when pumping water or idling in air.

Strainers

The suction strainers, foot valve and suction and discharge connections of the pump are all furnished with National Standard 2½ inch Fire Hose Threads per FED-STD H28/10. The pump may be operated with or without suction hose. When either strainer is installed directly on the suction end of the pump, without suction hose or foot valve, it is possible to pump down to within one inch of the bottom of compartment being unwatered.

The Star Strainer (Item No. 61) is furnished with National Standard 2½ inch Fire Hose Threads per FED-STD H28/10. This Strainer completely surrounds the pump and extends the full length of the Pump Frame. (Mount Star Strainer on Pump Unit only).

Cable

The pump is provided with 45 feet of 4 conductor type FHO-9 (9030 CM) portable cable from the plug to the switch, in accordance with Military Specification MIL-C-915/6, and from the switch to the pump with 30 feet type THOF-9 cable in accordance with the referenced Military Specification MIL-C-915/6. Two (2) 0.0625 inch diameter

steel strands and one bare copper conductor, size 2½ (26) in accordance with Specification MIL-C-915/6 are cabled with the three insulated conductors, one strand in each of the three filler spaces. This cable complies with all requirements for Type THOF cable except the flexing endurance test. The completed cable has a breaking strength of not less than 950 lbs. The strands are securely anchored to the terminal packing box (Item No. 30) in such a way that the insulated conductors are relieved of any strain if the pump is handled by the cable. The copper conductor acts as the main ground conductor and is grounded to the controller.

General

Care should be taken that the pump is rotating in the proper direction as indicated by the arrow on the pump casting; when looking at the runner end of the pump, the runner should rotate clockwise. The motor terminal and switch cable connections are such that when the black, white and red cable conductors are connected to the A, B and C phases respectively of the ship's service, the pump rotation should be correct. The steel seizing strands are the ground conductor.

DO NOT OPERATE THE PUMP AT ANY TIME WITHOUT THE SUCTION STRAINER ATTACHED.

The Star Strainer is attached directly to the pump, and should not be attached to the lower (suction) side of the foot-valve when suction hose is used. When the pump is used in this combination, the basket strainer should be attached to the foot-valve. (See photo inside frontispiece.)

The foot-valve is not required, and should not be used, when the pump is operated submerged. It should always be attached to the suction end of suction hose when pump is operated not submerged. See photograph frontispiece for completely assembled pump. Not more than 20 feet of suction hose should be used.

The pump is not self priming when operated un-submerged; therefore priming is required if it is to be so used. Priming may be accomplished by lowering the pump into the water until discharge starts and then raising the pump to the level desired. Priming may also be accomplished by removing the discharge hose and filling the pump and suction hose with water prior to starting the pump; the foot valve holding the water until pumping starts.

SECTION 2

General

To raise and lower the pump, on other than submarines where the pump is handled mainly through horizontal passageways with no need for a tending line, **THE PUMP TO BE RAISED OR LOWERED BY A NON-CONDUCTING MANILA OR NYLON ROPE** to preclude damaging the cable insulation against sharp objects or hatch edges.

DO NOT ALLOW PUMP TO CONTINUE RUNNING AFTER DISCHARGE STOPS.

Tools (in italics) referred to in Section 3 are detailed on Figure 9, Master Drawing Miscellaneous Details of Tools, Page 23, and listed on Page. 10.

DRAIN THE INTERMEDIATE OIL CHAMBER AFTER 400-500 HOURS OF USE OR 1 YEAR. This is done by removing the lower pipe plug (Item #5) in the pump housing, marked "OIL HERE" on the connection box cover side (Item No. 29) using wrench. Check for water. If none is found refill with 9 ozs. of Navy symbol 2135th Lubricating Oil. If two teaspoons of water is found, after oil is allowed to settle, replace the sylphon seals, and

refill with oil. This operation eliminates any water that may have leaked into the intermediate chamber, and also insures lubrication of the mechanical seal.

The ball bearings in this pump are of the grease-seal type, and require no lubrication. Excess grease or oil should be avoided since it would cause deterioration of the motor insulation.

Emergency Capabilities of Pump when Considered Expendable

When conditions warrant the risk of burning a motor, submersible pumps may be used for pumping fuel oil using two (2) pumps in series.

The table below is a list of fluids that can be pumped including - time and temperature. The maximum specific gravity of any fluid to be pumped is 1.04, and 10 centipoise (60 SUS Viscosity.) When pumping any flammable material the pump should be submerged.

Fluid	Time	Temperature		Explosion Risk Factor	After Running Flush With
		Min.	Max.		
Fresh Water	Continuous	—	130°F	None	Not Required
Sea Water	Continuous	—	130°F	None	Fresh Water
Oil Contaminated Water	Continuous	—	130°F	Low	
Gasoline	2 Hrs.	30°F	90°F	Very High	
Diesel Fuel Marine (DFM)	Continuous	50°F	100°F	Moderate	
Jet Fuel (JP-5)	Continuous	30°F	100°F	Moderate	
Slugs of Oil	15 Sec.	70°F	130°F	Low	Diesel Fuel or Kerosene and Fresh Water
Navy Distillate (ND)	1 Hr.	80°F	120°F	Moderate	
Heavy Fuel Oil	Not Recommended				

SECTION 3

Maintenance

Disassembly

CAUTION: USE CARE TO PROTECT CORROSION RESISTANT PLASTIC COATING DURING DISASSEMBLY AND ASSEMBLY.

To disassemble the pump, refer to master drawing, Fig. 1 thru 7 and proceed as follows:

1. Be sure that the plug at the end of the electric cable is removed from the electric outlet.
2. Drain intermediate chamber by removing the lower pipe plug (Item No. 5) in the pump housing, marked "Oil Here" on the connection box cover side (Item No. 29) using *Wrench*.
3. Unscrew strainer from pump (right hand threads).
4. Remove 8 nuts (Item No. 4) after which the suction cover (Item No. 19) may be removed. Care should be taken not to damage the gasket (Item No. 20) between the suction cover and the pump housing.
5. Remove the runner locking screw (Item No. 16) (right hand threads) and lock washer (Item No. 17). Use *shaft holding fixture*, which is fastened to the runner by means of two screws which fit into two tap holes in the "eye" of the runner. This wrench prevents the runner from turning. Holding the runner stationary, insert *runner retainer and locking screw wrench* through the hole in *shaft holding fixture*.
6. Remove runner retainer (Item No. 14) (right hand thread), and retainer washer (Item No. 14A). Use special wrenches as described in 5.
7. Pull the runner assembly (Item No. 13) off the shaft, and remove the runner key (Item No. 15). Remove retainer washer (Item No. 14A) and runner washer (Item No. 14B). Use *runner and splasher puller*.
8. Unscrew the oil cover (Item No. 7) (right hand thread) from the motor housing using sylphon seal retainer wrench, remove gasket (oil cover) (Item No. 7A).

Removal of the oil cover also brings with it the sylphon seal (Item No. 8) and retainer (Item No. 10). Remove retainer (Item No. 10) using *sylphon seal retainer wrench*, remove seal (Item No. 8) and seal gasket (oil cover) (Item No. 8A).

9. Remove the shaft sleeve (Item No. 18) and splasher assembly (Item No. 11). Item No. 11 may be pulled off at the shaft using *runner and splasher puller*, as in 7.
10. Remove sylphon seal (Item No. 8) and retainer (Item No. 9) by unscrewing from the pump housing (right hand threads) using *sylphon seal retainer wrench*. Remove seal gasket (Item No. 8A).
11. Turn to the discharge end of the pump and remove connection box cover (Item No. 29). Use *wrench* which exposes motor leads and terminal connections. Remove all leads from the terminal block.
12. Unscrew packing gland assembly (Item No. 30) (right hand thread) and remove cable from the pump.
13. Unscrew 8 frame stud nuts (Item No. 4) and remove discharge cover (Item No. 26) and remove bearing spring (Item No. 39). Care should be taken not to damage the gasket (Item No. 27).
14. Remove terminal bushing (Item No. 28) from the motor leads and the grommet (Item No. 67) from the ground lead.
15. Remove motor rotor assembly (Item No. 36). The lower motor bearing (Item No. 37) and upper motor bearing (Item No. 38) will be attached to the rotor shaft.
16. If desired to remove the motor stator, withdraw the motor leads and unscrew the frame motor retainer (Item No. 6) (right hand thread) using *motor retainer wrench*. The stator (Item No. 34) can now be removed from the pump frame by heating the frame and stator (in an oven) to approximately 450°F. Remove frame and stator from oven and tap frame (lead wires down) allowing stator to drop out onto wooden block.

SECTION 3 MAINTENANCE

Assembly

1. To reassemble the pump reverse the above outlined procedure; carefully locking each part in place as it is assembled. Special care should be taken in replacing gaskets, lead connections, etc. Clean all gaskets and metal to metal surfaces, and apply a coating of grease per MIL-G-23549.
See Table on Page 7 for torquing requirements of all threaded parts on pump.
2. Before the suction cover (Item No. 19) is replaced, turn the runner by hand to be sure there is no binding.
3. Be sure to replace the oil in the intermediate chamber.
4. Pipe Plugs (Item No. 5) and connection box cover (Item No. 29) shall be coated with grease and tightened thoroughly.
5. After pump is completely assembled, unscrew motor chamber pipe plug (Item No. 5, 1/2 inch I.P.), on the connection box cover side insert air connections for air line, connect to dry air line, and apply 50 pounds of air pressure to motor chamber, immerse pump in water to be sure there are no leaks in pump, i.e., no air bubbles appearing out of either intake, discharge, around (Item No. 5) pipe plugs, or (Item No. 29) connection box cover. If there are no leaks, replace motor chamber pipe plug (Item No. 5), grease on threads. Tighten plug using wrench.
6. Run the pump, in air without pumping water, for a few minutes to check for possible rubbing or binding, and to check direction of rotation.
7. Use grease on all the following items:
 - (1) Oil chamber and motor chamber pipe plugs (Item No. 5).
 - (2) Connection box cover threads and seat (Item No. 29).
 - (3) Oil cover threads and seat (Item No. 7).
 - (4) On surface where syphon seal (Item No. 8) contacts seal gasket (Item No. 8A).
 - (5) All gasketed surfaces (Item No. 7A, 8A, 10A, 20, 27) and around the outside of terminal bushings (Item No. 28).

CAUTION: All threads, joints, gaskets, and adjacent unplasticized areas must be covered with grease per MIL-G-23549, to prevent corrosion. This grease is available in one (1) pound (NSN 9150-00-985-7316) and five (5) pound (NSN 9150-00-235-5555) containers. Sealing areas that have become rough or deteriorated are to be made up with sealing compound per MIL-S-45180B (Similar to Permatex 2 or equal) in lieu of grease per MIL-G-23549.

Electrical Check-Out

1. Ground Continuity Measurement—(See Drawing 576905)
The ground circuit from the ground wire termination at the cable clamp (62) and the motor field (34) depends on intimate **Electrical** contact between the packing box (30) and discharge head (26); The discharge head and the frame studs (2 & 3); the frame studs and frame (1). Units, made to "E" Revision and subsequent, include a ground lead wire assembly, to improve contact between the frame and discharge head.
Whenever the packing box or discharge head is removed and reassembled, the following ground circuit test must be performed.
Clamp together the 3 steel ground wires or the 2 steel and 1 copper ground wire, whichever may be present, to form one terminal of the circuit tester. Use a bridge megger, Biddle 21776 or equivalent, capable of delivering 20 V.D.C., as a circuit tester. The other terminal is attached to the clean interior of the frame plug hole.
If the ground wires are 3 steel wires, the measured resistance must be 2.3 OHMS maximum at 25°C. If the ground wires are 2 steel and 1 copper, the measured resistance must be .015 OHMS maximum at 25°C. If these maximum resistances are exceeded, all joints and fasteners from cable to frame must be reworked.
2. Insulation Test
The following procedure shall be used to conduct insulation resistance tests when required.
Obtain a 500 V.D.C. insulation megger with a range of 0-2000 MEGOHMS; Biddle, 21778 or equivalent, is satisfactory.
Prior to application of the voltage, discharge the winding by connecting the winding to the frame. After 60 seconds disconnect the winding and frame.
Apply 500 Volts direct current between the stator winding and frame. (Frame Plug Hole.) Maintain the voltage for a minimum of 60 seconds.
Check Insulation Resistance To Ground per paragraph 3.1.31.1 (d) of Spec. MIL-M-17060C. The insulation resistance of the motor (pump) shall not be less than 100 MEGOHMS. Maximum insulation resistance under all conditions is defined in Paragraph 3.1.31.1. (d) of MIL-M-17060C.
The insulation resistance measurements shall be corrected to 25°C. Correction shall be made on the basis of insulation resistance doubling for each 15°C decrease in temperature.

*Do not heat the stator on reassembly. Ambient temperature stator to be dropped in heated frame with the three lead wires located approximately 1.0 inch offset in either direction from the frame lead wire holes.

Table for Torquing Threaded Fasteners on Pump

Item No.	Part No.	Name	Torque
2	1493AB	Frame Stud Long	120 In./Lbs.
3	1471AB	Frame Stud Short	120 In./Lbs.
4	A15624HNM1	Frame Stud Nut	100 In./Lbs.
5	1592AB	Frame Pipe Plug	60 Ft./Lbs.
6	1326AB	Stator Retainer	100 Ft./Lbs.
7	4264AB	Oil Cover	100 Ft./Lbs.
9	1485AB	Seal Retainer R.H.	150 Ft./Lbs.
10	1486AB	Seal Retainer L.H.	150 Ft./Lbs.
14	1331AB	Runner Retainer	50 Ft./Lbs.
16	1332AB	Locking Screw	100 In./Lbs.
29	1484AB	Connection Box Cover	90 Ft./Lbs.
30	33259AC	Packing Box	85 Ft./Lbs.
31	1345AB	Gland	80 Ft./Lbs.
43	1492	Terminal Nut	15 In./Lbs.
44	A11024RHB12	Terminal Block Screw	15 In./Lbs.
45	558303-1	Studs	120 In./Lbs.
45A	A1439	Screw	100 In./Lbs.
63	A10632PHC10	Cable Clamp Screw	4 In./Lbs.
65	A10832RHB4	Ground Screw	4 In./Lbs.